Release 1.0 for CoMo softwareupdate 1.40

Owners Manual for the Add-On "Solar GPS"

The “SolarGPS” module will only work in conjunction with a CoMo AV.
To ensure proper operation you must have the correct software installed in the CoMo. We recommend at least Version (see Chapter 5).

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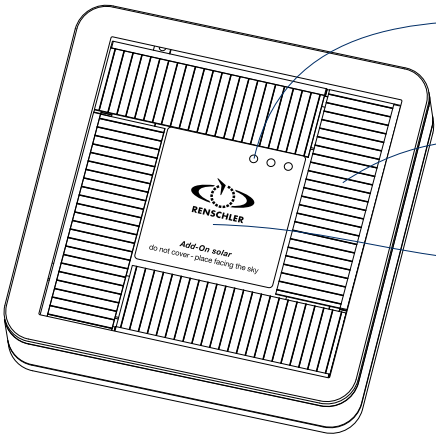
1. Device description and mounting

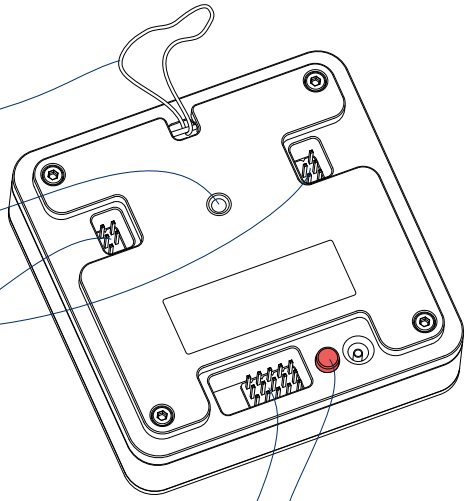
1.1 Device description of the "SolarGPS"



Ambient light detector:
Regulates the charging of the buffer according to the available light.

Solar cells:
The solar cells are embedded in silicon below a protective polycarbonate front screen

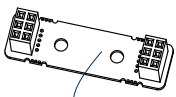
GPS antenna:
The GPS receiver is positioned beneath the front screen.



Lanyard:
Acts as a back-up to the mount chosen for the CoMo

Mounting hole (M4 x 8 mm):
used to attach the various options for both hang glider and paraglider mounts.

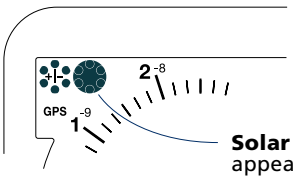
Add-on module connector:
further modules can be attached via these ports



Connector bridge (horizontal):
Connects the CoMo AV to add-on modules. Default is horizontal.

Key:
No function on the SolarGPS

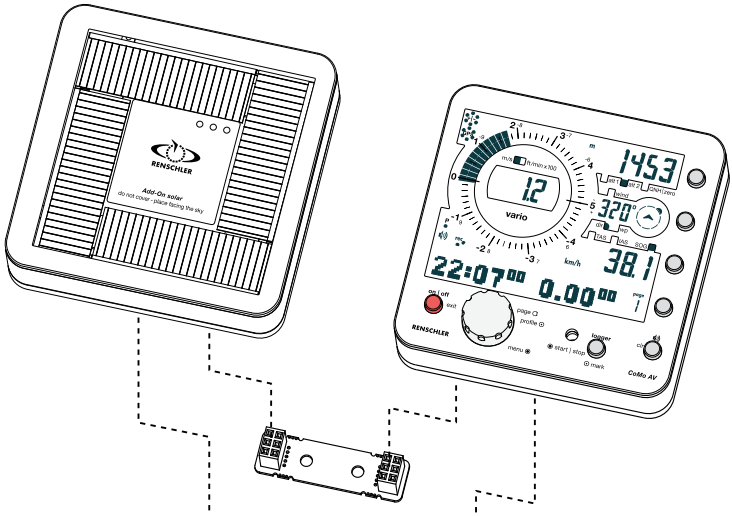
External connectors:
No function on the SolarGPS



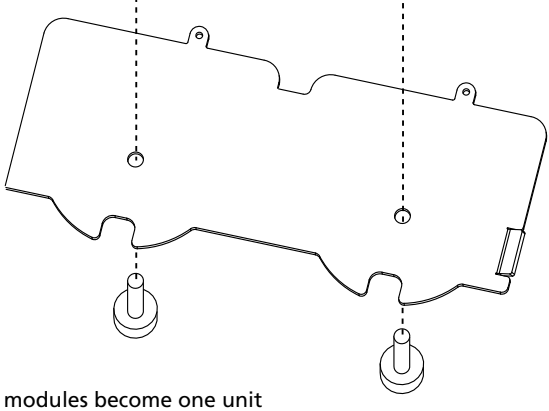
Solar power status indicator
appears on the CoMo display

1.2 mounting the “SolarGPS” add-on module
You can mount the add-on module on either side of the CoMo.

For right handed people we recommend the mounting on the left, so that the operation of the instrument will not obscure the solar cells or GPS antenna.



a) The connector bridge is used to connect the two modules horizontally



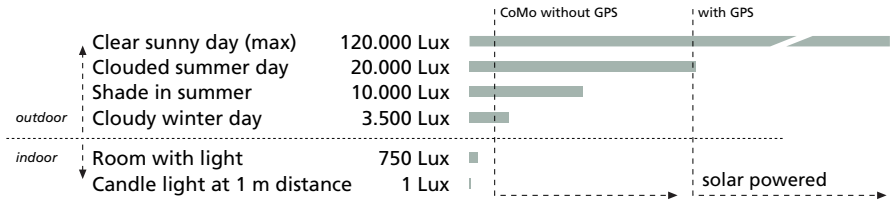
b) The modules become one unit when secured to the mounting plate using 2 screws

2. About solar power

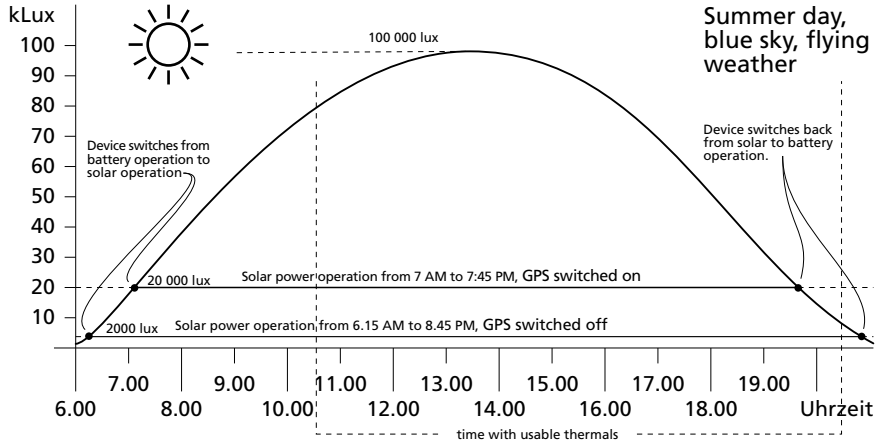
2.1 What the sun does

The light intensity changes with the day, the season, the weather and the location. The measure for light intensity is the Lux.

The table below gives some examples:



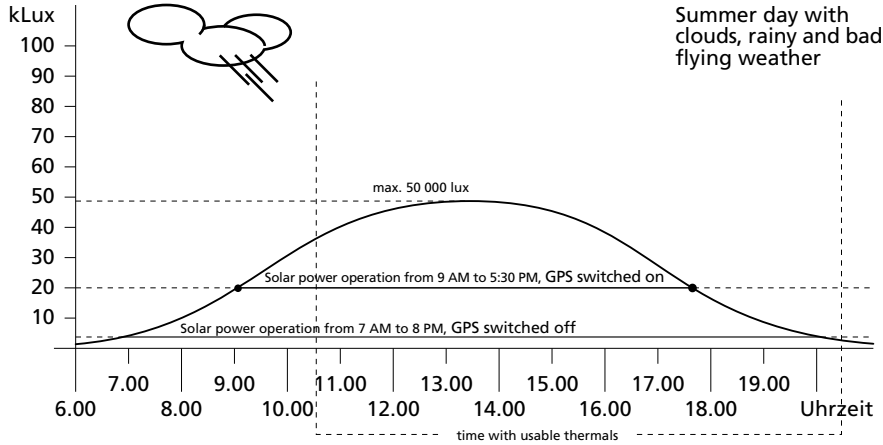
The CoMo without GPS works with only 2000-4000 Lux. For Solar-powered operation with the GPS it needs at least 20000 Lux.



The graph shows how light intensity increases from dawn until noon (zenith) and then decreases until the evening

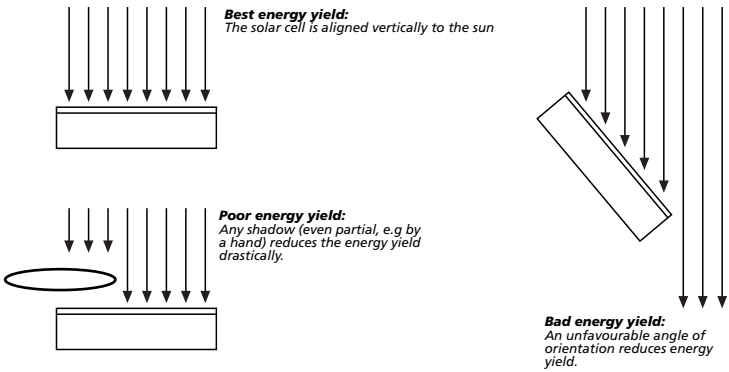
In summer the instrument may be solar powered from 7 AM to 7:45 PM. If the GPS is switched off the CoMo will work nearly the whole day on solar power alone.

In bad weather the light intensity curve only reaches a maximum 50000 lux. Even so, the CoMo SolarGPS generates enough power to work between 9 AM and 5:30 PM. In these conditions there will only be weak thermals and dynamic soaring is more likely.



2.2 Correct alignment of the solar cells

It is essential that the solar cells are correctly aligned. The alignment should be vertical to the sun, so the maximum light falls on the solar cells. This is particularly important in the morning and evening.


Best energy yield:
The solar cell is aligned vertically to the sun
Poor energy yield:
Any shadow (even partial, e.g by a hand) reduces the energy yield drastically.
Bad energy yield:
An unfavourable angle of orientation reduces energy yield.

When cloudy, the alignment is less crucial because the sunlight will be scattered strongly.

3. Power management of the SolarGPS module.

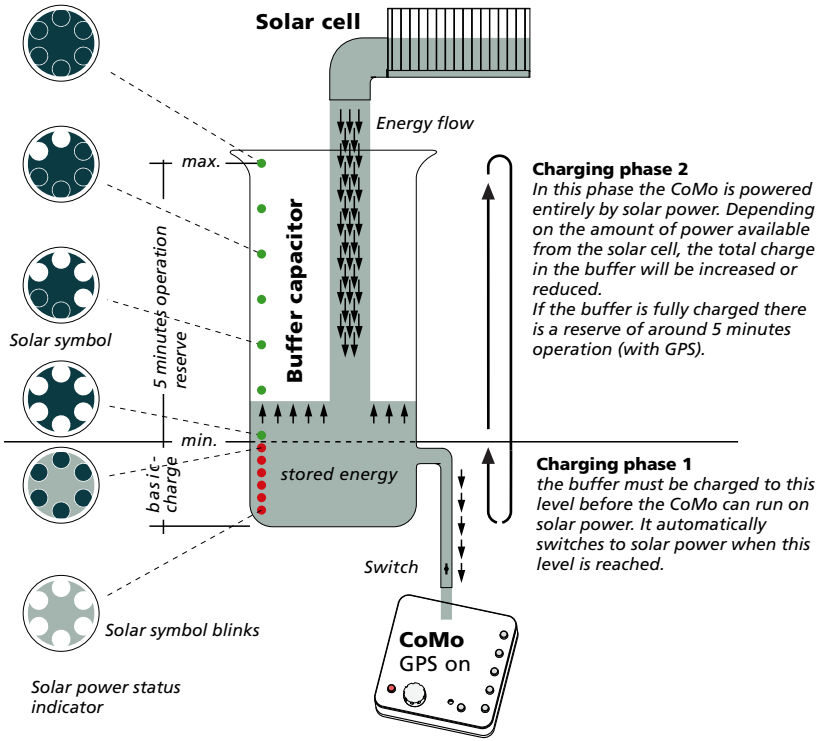
3.1 How it works

The solar cell generates energy when it is exposed to light. This energy is stored in a buffer (capacitor), which makes power available during short term light fluctuations. When completely charged it can run the instrument for up to 5 minutes (25 – 50 minutes with GPS switched off)

The buffer is charged in two phases:

Charging Phase 1: In this phase the sunlight symbol blinks infrequently. The buffer is charged to a specific value, which is the minimum necessary charge and cannot be used to power the instrument. In this phase the CoMo takes power from the batteries.

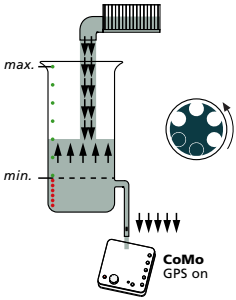
Charging Phase 2: In this phase the sunlight symbol shows continuously, and the CoMo switches to solar power operation. If the solar cell delivers only 50 % of the necessary power, the CoMo will switch between solar power operation and battery operation with a 50% duty cycle. If the solar cell delivers excess energy it is used to charge the buffer.


Solar cell
Energy flow
max.
5 minutes operation reserve
Buffer capacitor
Solar symbol
min.
basic-charge
stored energy
Switch
Solar symbol blinks
Solar power status indicator
CoMo
GPS on
Charging phase 2
In this phase the CoMo is powered entirely by solar power. Depending on the amount of power available from the solar cell, the total charge in the buffer will be increased or reduced.
If the buffer is fully charged there is a reserve of around 5 minutes operation (with GPS).
Charging phase 1
the buffer must be charged to this level before the CoMo can run on solar power. It automatically switches to solar power when this level is reached.

Note: The buffer is also charged when the CoMo is switched off. Thus it is a good idea to put the CoMo in sunlight for some minutes before switching it on, so it is immediately solar powered.

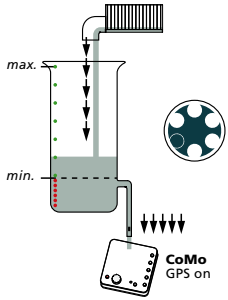
3.2 Examples of real world power situations

Turning on the CoMo after it has been in sunlight for some minutes (standard situation)



The buffer already has surplus energy stored, so the CoMo immediately runs on solar power. The buffer will continue charging until it is full.

flight under a cloudy sky

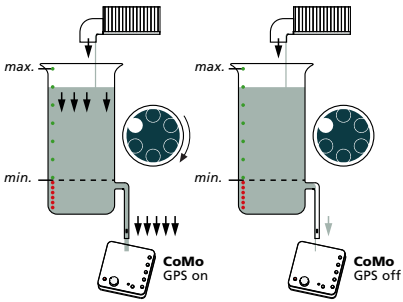


The solar cell delivers exactly the amount of energy necessary to operate the CoMo and GPS. The charge level of the buffer is maintained.

Flight in the evening near sunset

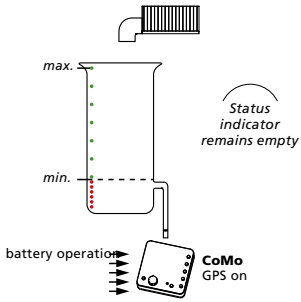
a) with GPS

b) without GPS



The solar energy is insufficient to power the CoMo and GPS (a), so the buffer delivers its energy. When it is empty the CoMo automatically switches to battery operation.
Without GPS (b) the CoMo requires very little energy. The power available from the buffer lasts 5 to 10 times as long.

Indoor operation or winter

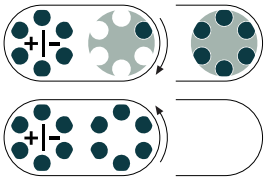


If the buffer is empty, and indoor light is not sufficient to charge it, the CoMo operates on battery power.

3.3 the solar power status display

The solar power status display is located next to the battery status indicator of the CoMo.

Charging phase 1:



the sun symbol is blinking + the number of points in the symbol increase. The instrument is not solar powered. The buffer is charged until it reaches the minimum operating level, when all 6 points are shown.

Charging phase 2 (more than 1.8 volts)

The continuous sun symbol indicates that the instrument is now solar powered.

Sun symbol + increasing number of points : The instrument is completely solar powered and surplus energy is charging the buffer.

Sun Symbol + decreasing number of points: The energy from the solar cell is not sufficient and energy is drawn from the buffer to ensure solar operation. (e.g. in shadow).

no sun symbol = battery operation. Solar buffer empty.

3.4 the solar power page

The solar power page gives detailed information about the solar power system and the also the battery status of the CoMo (see CoMo owners manual)

Counter for hours of operation:
Shows how many hours the CoMo has worked with solar power

Buffer Voltage:
This shows the state of charge of the buffer. If this value increases the buffer is being charged. If it decreases the buffer is discharging. The CoMo will be solar powered from 1.8 volts. The maximum charge is 2.3 volts.

solar voltage indication — *operating hours counters*

4. Description and use of the GPS receiver.

As with the solar cells, the GPS receiver must be correctly aligned to the sky. The GPS receiver antenna should not be covered, or GPS signal reception will fail.

A complete description of the the GPS functions are available in an additional owners manual (Navigation instruction manual).

5. Software updates via Internet

IMPORTANT: During internet update the solar cell MUST be covered so as to ensure that the CoMo operates from batteries. Switching from solar power to battery power during the update operation could lead to a malfunction.
Before an update always ensure that the batteries are good.

You find the latest software on **www.renschler.de**

6 Maintenance

6.1 Overheating
Never expose your CoMo to extreme temperature, e.g. behind the windscreen of the car (greenhouse effect). Overheating may cause severe damage.

6.2 Water Landing
After a water landing especially in salt water batteries should be removed immediately. Open the housing (4 screws on the rear), rinse all PC-boards carefully with clean water and dry them thoroughly afterwards.

Important: If the CoMo doesn't work after this procedure, **remove the batteries at once to avoid further damage!** In this case you have to send your CoMo in for repair **(without batteries!!!)**.

6.3 Cleaning
Use a wet cloth for cleaning. No aggressive cleaners.

6.4 Storage
If you are not using your CoMo for a longer period of time, then remove the batteries and store it in a cool, dry place.

7 Warranty Information

7.1 Disclaimer

Electronic or mechanical failures may cause false readings, eg: pressure transducer damage may result in incorrect altitude values! Renschler is not liable for any damage or injury caused by a faulty instrument – the pilot is solely responsible for safety in flight.

7.2 Warranty

We issue a guarantee of 2 years on material and processing defects.
Electronic or mechanical damage after a crash or waterlanding is not covered.

8. Technical data

Solar cells	· 4 solar cells 2.3 volts max, 240 mA
Buffer	· Gold capacitor 30 F. Fully charged, it can power the CoMo with GPS for about 5 minutes,
	· or between 25 and 50 minutes without GPS.
Weight	· 99 g
Dimensions	· 80 x 80 x 24 mm

only Add-On with GPS:

GPS-Empfänger	· 16 channels
	· 1 second update rate
Current consumption	· Max 17 mA (cold start situation) Min 16 mA (normal operation, tracking)

errors, ommisions, tech. changes,
delivery & prices excepted

RENSCHLER

Ingenieurbüro Renschler,
Tel.: +49 (0) 711 - 879 462, FAX: +49 (0) 711 - 870 11 80,
Kirchtalstr. 30, D-70435 Stuttgart, Germany, www.renschler.de

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